PCS COMPANY
www.pcs-company.com

Temperature Control Systems

Table of Contents

Modular Temperature Controllers

Product Features

PCS Modular Controllers incorporate many user-friendly features.

- Compatible with all industry standard "G" Series® style temperature control modules and mainframe systems
- Automatic (closed loop) & Manual (open loop) control modes
- Current (Amps) monitoring
- Boost power output function in both automatic and manual control modes
- Fully automatic, adaptive tuning of PID variables
- User selectable automatic Thermocouple break hold function (transfers power setting to manual mode if T/C is lost)
- Full diagnostics (fault recognition) with English fault code display
- Ground fault protection
- User selectable delay for shorted T/C diagnostic to prevent premature alarm on slow or heavy loads
- J type T/C standard, user selectable K type option
- Alarm output communications compatibility
- Automatic slow start temperature ramp for wet heater dry out
- Operating voltage can easily be changed to 120v via printed circuit board jumpers
- Anti-arc (high voltage) protection circuit to prevent electrical damage if the controller is accidentally installed or removed from the mainframe with power applied. Circuit may be disabled.
- CE, WEEE, and RoHS Compliant
- 2 year product warranty (excluding fuses and triacs)
- Proudly made in the U.S.A.

VC-1F

VC-1F-1*

1 Zone

2 Zone

5 Zone

8 Zone

12 Zone

*See page 4

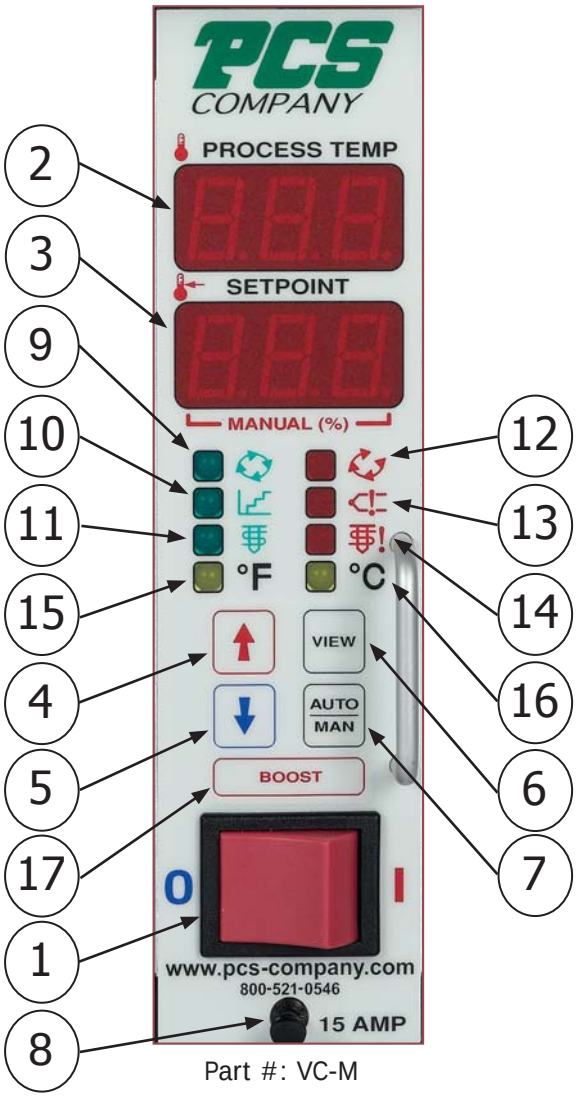
VC-M 15 Amp Module

CONTROLS

1. Power Switch(ON/OFF)
2. Process Temperature Display
Also Displays/Diagnostics/Fault mnemonics
3a. Setpoint Temperature Display (Shown at Right)
In Automatic (Closed Loop) Control Mode
3b. Load Power (%) Output Display
In manual (Open Loop) Control Mode
3c. Amps(Load Current) Display
in Amps Monitor/Display Mode
4. Increment Key
Increment Setpoint in Automatic Mode
Increment Power Output in Manual Mode
5. Decrement Key
Decrement Setpoint in Automatic Mode
Decrement Power Output in Manual Mode
6. View Key
In automatic Mode Displays % Power or Amps
In Manual Mode Displays Amps
7. Automatic/Manual Control Mode Select Key
8. Plastic Retention/ Locking Device

INDICATORS

9. Automatic (Closed Loop) Control Mode Indicator
10. Start-Up Power Ramp Indicator
11. Load Power Indicator
12. Manual (Open Loop) Control Mode Indicator
13. Thermocouple Fault Indicator
14. Output (Power) Fault Indicator
15. Fahrenheit Temperature Scale Indicator
16. Celsius Temperture Scale Indicator
17. User Executed Boost Power Output Mode:
+25% to Current % Power - OR- 100% Power
User Selected via PC Board DIP Switch



Part #: VC-M

Operates on 208v & 240v

Diagnostics

Over Temperature Indication (+30°F/+17°C) HI
LED Display with Accessory Alarm Ouput

Under Temperature Indication (-30°F/-17°C) LO
LED Display with Accessory Alarm Ouput

Open T/C Indication..... oPE
LED Display with Accessory Alarm Ouput

Reverse T/C Indications..... bAC
LED Display with Accessory Alarm Ouput

Diagnostics

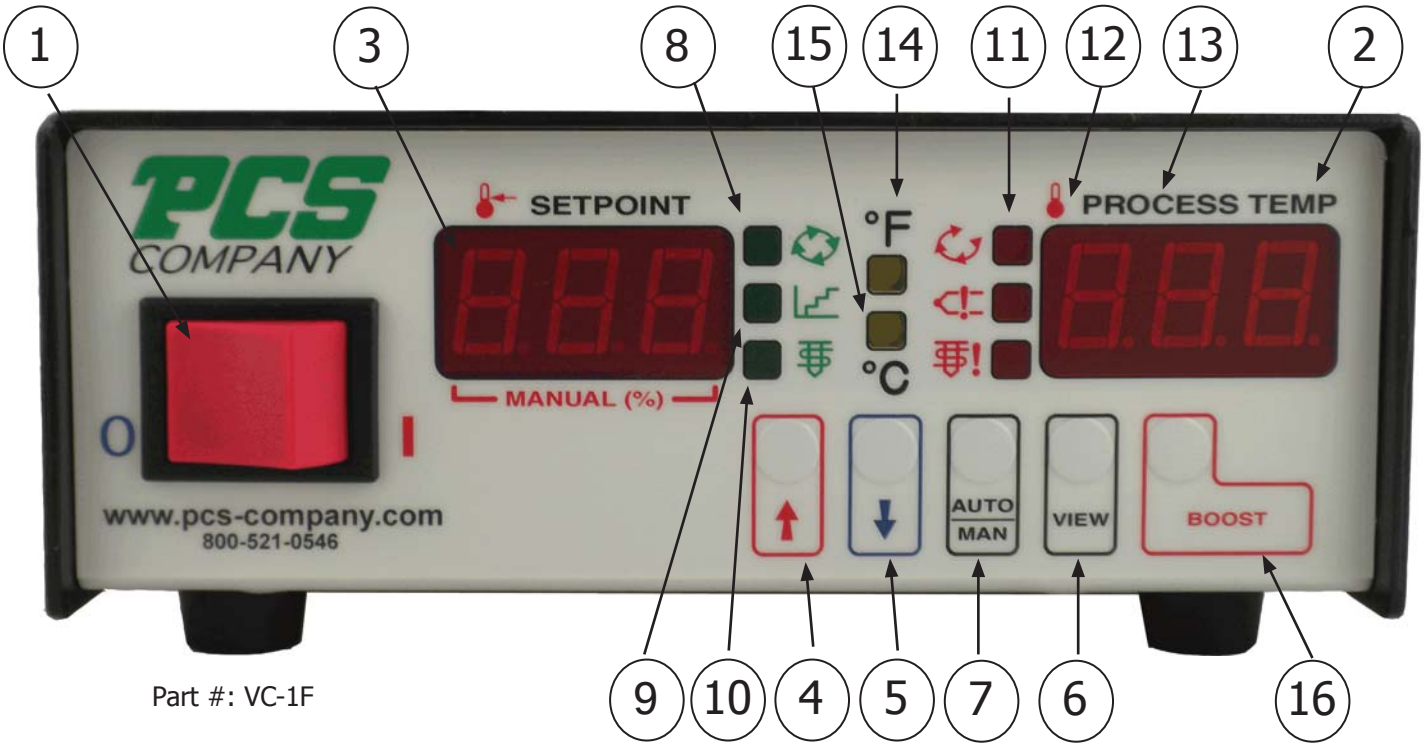
Shorted T/C Indication..... Sho
LED Display with Accessory Alarm Ouput

Shorted Output Indication..... ShO
LED Display with Accessory Alarm Ouput

Open Output Indication..... oPO
LED Display with Accessory Alarm Ouput

Ground Fault Indication..... FAL
LED Display with Accessory Alarm Ouput

Single Zone Hot Runner Temperature Controller



Part #: VC-1F

CONTROLS AND INDICATORS

1. Power Switch Both sides of the AC line fuse protected
2. Process Temperature Display (Also Displays Diagnostics)
3. **Setpoint Temperature Display (Auto)**
   (%) Percent of Power Display (Manual)
   Load Current (Amps) Display
4. Increment Control (Setpoint and % Power)
5. Decrement Key (Setpoint and % Power)
6. View Control (Display Setpoint, % Power or Amps)
7. Automatic / Manual Control Mode Select
8. Automatic (Closed Loop) Control Mode Indication
9. Start-Up Power Ramp Indication(Wet heater bake-out)
10. Load Power Indication
11. Manual (Open Loop) Control Mode Indication
12. Thermocouple Fault Indication (Also LED code below)
13. Output Fault Indication (Also LED code below)
14. Fahrenheit Temperature Mode Indication
15. Celsius Temperature Mode Indication
16. **User Executed Boost Power Output Mode:**
    +25% to Current Power-OR-100% Power
    User Selected via PC Board DIP Switch

Diagnostics

Over Temperature Indication (+30°F/+17°C) HI
LED Display with Accessory Alarm Ouput

Under Temperature Indication (-30°F/-17°C) LO
LED Display with Accessory Alarm Ouput

Open T/C Indication..... oPE
LED Display with Accessory Alarm Ouput

Reverse T/C Indications..... bAC
LED Display with Accessory Alarm Ouput

Diagnostics

Shorted T/C Indication..... Sho
LED Display with Accessory Alarm Ouput

Shorted Output Indication..... ShO
LED Display with Accessory Alarm Ouput

Open Output Indication..... oPO
LED Display with Accessory Alarm Ouput

Ground Fault Indication..... FAL
LED Display with Accessory Alarm Ouput

Modular Temperature Controller Guide

VC-1F
VC-1F-1

VC-1ZF
Mainframe
(module not included)

VC-2F
Mainframe
(modules not included)

This guide will assist in the selection of the correct mainframes and accessories for your next application. 1-48 zones available.

Zone(s)	Mainframe	Volts	Combination Thermocouple Power Cable	Qty. Req.	Combination Thermocouple Power Connector	Qty. Req.	Module	Qty. Req.
1	VC-1F	240v	VC-MPTC-15	1	CKPTIC-1	1	N/A	N/A
1	VC-1F-1*	120v	VC-MPTC-15	1	CKPTIC-1	1	N/A	N/A
1	VC-1ZF	240v	VC-MPTC-15	1	CKPTIC-1	1	VC-M	1
2	VC-2F	240v	VC-MPTC-15	2	CKPTIC-1	2	VC-M	2

VC-5F
Mainframe
(modules not included)

Zones	Mainframe	Mold Power Cable	Qty. Req.	Thermocouple Cable	Qty. Req.	Mold End Pre-Wired Terminal Mounting Boxes	Qty. Req.	Module	Qty Req.
5	VC-5F	VC-5PC	1	VC-5TC	1	VC-5TB-TS	1	VC-M	5
8	VC-8F	VC-8PC	1	VC-8TC	1	VC-8TB-TS	1	VC-M	8
12	VC-12F	VC-12PC	1	VC-12TC	1	VC-12TB-TS	1	VC-M	12

VC-12F
Mainframe
(modules not included)

Zones	Mainframe	Mold Power Cable	Qty. Req.	Thermocouple Cable	Qty. Req.	Mold End Pre-Wired Terminal Mounting Boxes	Qty Req.	Module	Qty Req.
16	VC-16F	VC-8PC	2	VC-8TC	2	VC-8TB-TS	2	VC-M	16
20*	VC-20F	VC-8PC VC-12PC	1 1	VC-8TC VC-12TC	1 1	VC-8TB-TS VC-12TB-TS	1 1	VC-M	20
24	VC-24F	VC-12PC	2	VC-12TC	2	VC-12TB-TS	2	VC-M	24
28*	VC-28F	VC-8PC VC-12PC	2 1	VC-8TC VC-12TC	2 1	VC-8TB-TS VC-12TB-TS	2 1	VC-M	28
32*	VC-32F	VC-8PC VC-12PC	1 2	VC-8TC VC-12TC	1 2	VC-8TB-TS VC-12TB-TS	1 2	VC-M	32
36	VC-36F	VC-12PC	3	VC-12TC	3	VC-12TB-TS	3	VC-M	36
40*	VC-40F	VC-8PC VC-12PC	2 2	VC-8TC VC-12TC	2 2	VC-8TB-TS VC-12TB-TS	2 2	VC-M	40
44*	VC-44F	VC-8PC VC-12PC	1 3	VC-8TC VC-12TC	1 3	VC-8TB-TS VC-12TB-TS	1 3	VC-M	44
48	VC-48F	VC-12PC	4	VC-12TC	4	VC-12TB-TS	4	VC-M	48

*When ordering 20, 28, 32, 40 and 44 zone mainframes, please note the additional items and quantities required.
For power input wiring schematics see users manual.
PCS Company offers affordable and fast repair services for your Modular Temperature Controllers.

Over/Under Temperature Alarm
1 Amp - 240 VAC

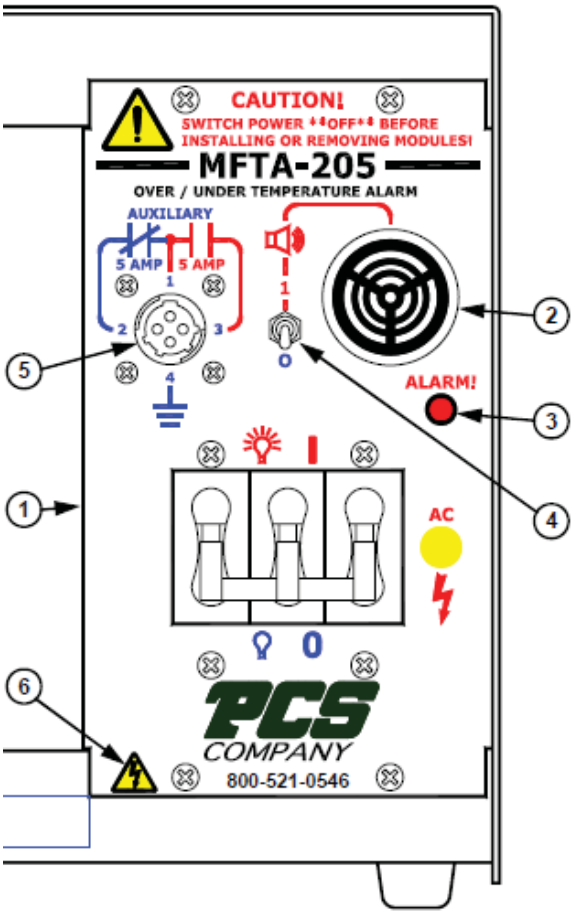
The PCS Company Over / Under Temperature Alarm accessory was designed to interface with the VC-M Temperature Controller. When any individual VC-M (1 to 48 units) realizes a 30°F (17°C) temperature difference between Setpoint and Process Temperature the VC-M will trigger the MFTA-205 Audible Alarm and Auxiliary Output connector contacts. (The VC-M will also trigger the alarm when any fault condition is encountered, such as Open Thermocouple, Shorted Thermocouple, Open Output, etc.)

Unlike competitors' alarm modules, the MFTA-205 does not require a mainframe "zone." The circuitry is positioned behind the mainframe circuit breaker panel and AC power is connected to the mainframe power distribution bus. This method of housing the circuitry is less expensive and saves a very valuable zone position. An auxiliary connector (and mating plug) providing 5 amp normally open and normally closed contacts is provided. The MFTA-205 can be ordered and easily installed as a kit, or can be specified and installed into the mainframe at the time of order.

Notes:
- The MFTA-205 will also work with competitors' temperature control modules that use the same communications bus alarm circuit.
- The MFTA-205 requires the mainframe communications bus option to communicate with the temperature control modules.

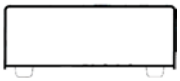
CONTROLS AND INDICATORS

1. Faceplate - Interchangeable with Mainframe Circuit Breaker Mounting Plate.
(Circuit breaker not included)
2. Audible Alarm Beeper
3. Red Alarm LED
4. Alarm Beeper Enable/Disable Switch
5. Auxiliary Connector (Mate Included)
   Provides one set each of 5 Amp Normally open & normally closed Switch Contacts
6. Caution, risk of electrical shock symbol

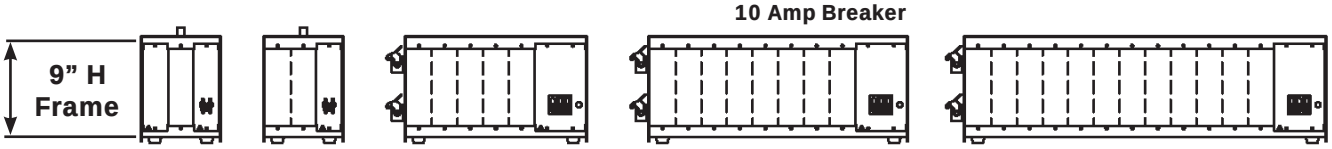


Modular Temperature Controller Mainframe System Configurations

The diagram below provides amperage and stack heights of modular controllers.



VC-1F & VC-1F-1(Horizontal)
10 Amp Breaker



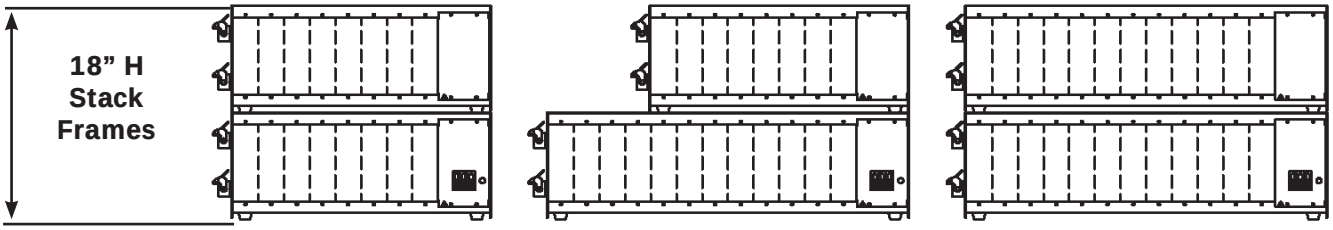
VC-1ZF
10 Amp Breaker

VC-2F
20 Amp Breaker

VC-5F
50 Amp Breaker

VC-8F
50 Amp Breaker

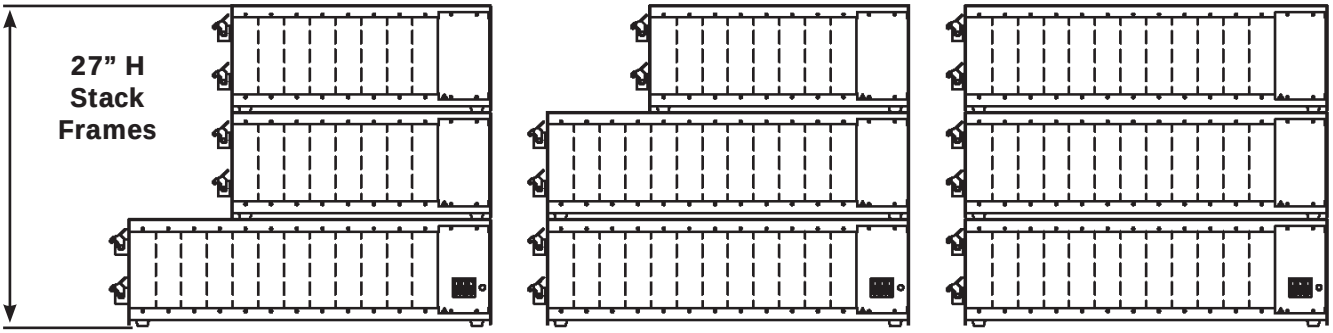
VC-12F
50 Amp Breaker



VC-16F
70 Amp Breaker

VC-20F
70 Amp Breaker

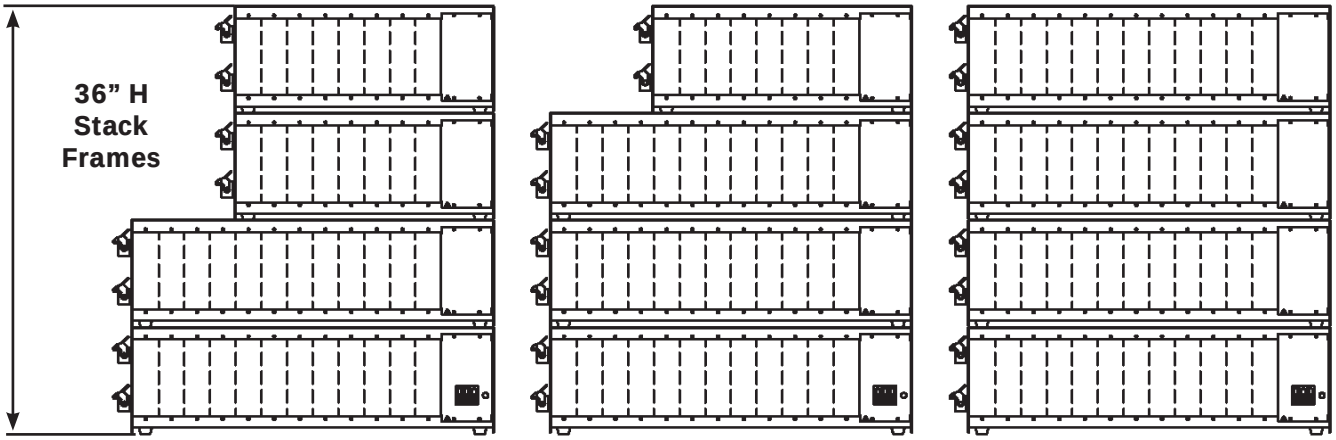
VC-24F
70 Amp Breaker



VC-28F
70 Amp Breaker

VC-32F
70 Amp Breaker

VC-36F
70 Amp Breaker



VC-40F
70 Amp Breaker

VC-44F
70 Amp Breaker

VC-48F
70 Amp Breaker

100 Amp breaker available upon request

Phone: 800-521-0546 **www.pcs-company.com** **E-mail: sales@pcs-company.com** **Fax: 800-505-3299**

Mold End Prewired Terminal Mounting Boxes

When ordering combination mounting boxes choose the item number and required quantity for the selected mainframe zones.

VC-2TB-TS

VC-5TB-TS

VC-8TB-TS

VC-12TB-TS

Mold End Prewired Terminal Mounting Boxes

Mainframe Zone	Item Number	Qty. Required	Additional Item Number	Additional Qty. Required
2	VC-2TB-TS	1		
5	VC-5TB-TS	1		
8	VC-8TB-TS	1		
12	VC-12TB-TS	1		
16	VC-8TB-TS	2		
20*	VC-8TB-TS	1	VC-12TB-TS	1
24	VC-12TB-TS	2		
28*	VC-8TB-TS	2	VC-12TB-TS	1
32*	VC-8TB-TS	1	VC-12TB-TS	2
36	VC-12TB-TS	3		
40*	VC-8TB-TS	2	VC-12TB-TS	2
44*	VC-8TB-TS	1	VC-12TB-TS	3
48	VC-12TB-TS	4		

*When ordering 20, 28, 32, 40 and 44 zones, please note the additional items and quantities required.

Mold End Prewired Terminal Mounting Boxes

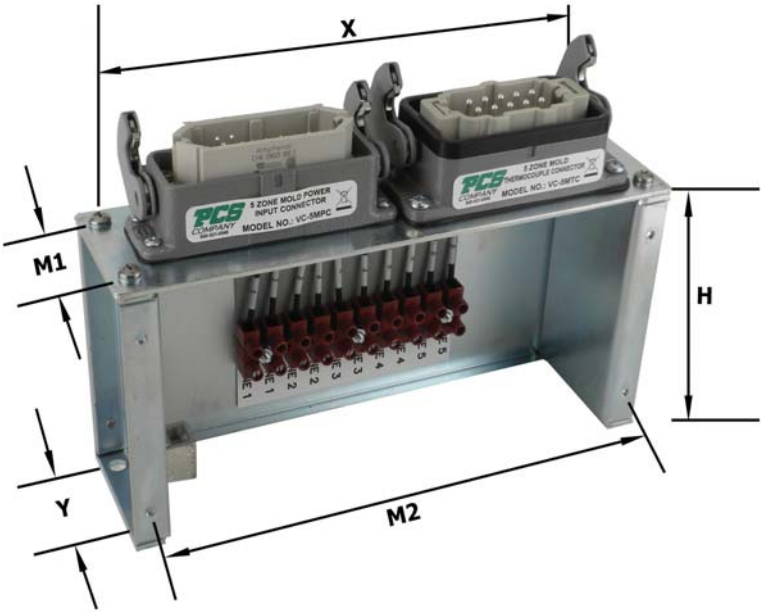
VC-2TB-TS

VC-5TB-TS

VC-8TB-TS

VC-12TB-TS

Choose Prewired Terminal Mounting Boxes to save time and money during installation. Comes with all necessary connectors for easy set up.
Service friendly maintenance.



M= Mounting screw spacing. Clearance for 1/4 SHCS.

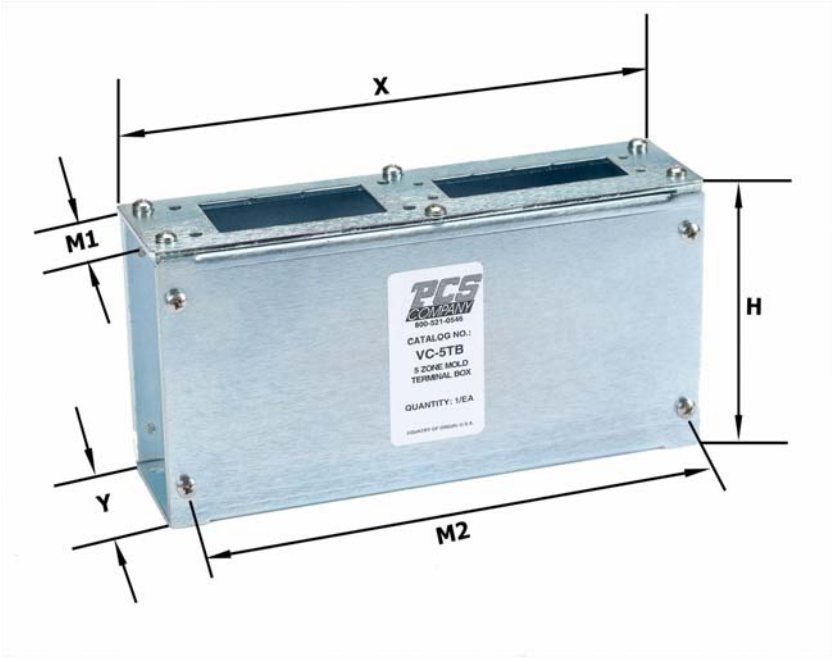
Mold End Prewired Terminal Mounting Boxes

Item Number	Dimensions in inch					Includes
	Y	X	H	M1	M2	
VC-2TB-TS	2.750	4.880	4.250	1.500	4.250	(2) CKPTIC-1
VC-5TB-TS	2.750	8.660	4.250	1.500	8.031	VC-5MPC, VC-5MTC
VC-8TB-TS	2.750	9.470	4.250	1.500	8.843	VC-8MPC, VC-8MTC
VC-12TB-TS	2.750	10.530	4.250	1.500	9.906	VC-12MPC, VC-12MTC

Comes with all necessary connectors installed and pre-wired to the terminal strip.

Mold End Blank Combination Terminal Mounting Boxes

Choose the Combination Terminal Mounting Box for its economical and rugged design.



M= Mounting screw spacing. Clearance for 1/4 SHCS.

VC-2TB

VC-5TB

VC-8TB

VC-12TB

Mold End Blank Combination Terminal Mounting Boxes

Item Number	Dimensions in inch					Accepts
	Y	X	H	M1	M2	
VC-2TB	2.750	4.880	4.250	1.500	4.250	(2) CKPTIC-1
VC-5TB	2.750	8.660	4.250	1.500	8.031	VC-5MPC, VC-5MTC
VC-8TB	2.750	9.470	4.250	1.500	8.843	VC-8MPC, VC-8MTC
VC-12TB	2.750	10.530	4.250	1.500	9.906	VC-12MPC, VC-12MTC

Mold Power & Thermocouple Cables

Mold power cables are used to connect the mainframe to the power input connector on the mold. Available in lengths of 10, 15 & 20 feet. The VC-12PC mold power cable also serves as a universal cable for connecting any 15 Amp mainframe to any 15 Amp mold power input connector. The maximum number of zones will be determined by the connector in the mold. **Special Power and Thermocouple Cables Available Upon Request.**

Mold Power cables

Item Number	Number of zones (Max.)	From 15 Amp mainframe(s)	To mold end	Length
VC-5PC10	5	5, 8, 12 zone	VC-5MPC	10 ft.
VC-8PC10	8	8, 12 zone	VC-8MPC	10 ft.
VC-12PC10	12	12 zone	VC-12MPC	10 ft.
VC-5PC	5	5, 8, 12 zone	VC-5MPC	15 ft.
VC-8PC	8	8, 12 zone	VC-8MPC	15 ft.
VC-12PC	12	12 zone	VC-12MPC	15 ft.
VC-5PC20	5	5, 8, 12 zone	VC-5MPC	20 ft.
VC-8PC20	8	8, 12 zone	VC-8MPC	20 ft.
VC-12PC20	12	12 zone	VC-12MPC	20 ft.

Thermocouple cables are used to connect the mainframe to the thermocouple connector on the mold. Available in lengths of 15 feet.

Thermocouple cables

Item Number	Number of zones (Max.)	From 15 Amp mainframe(s)	To mold end	Length
VC-5TC10	5	5, 8, 12 zone	VC-5MTC	10 ft
VC-8TC10	8	8, 12 zone	VC-8MTC	10 ft
VC-12TC10	12	12 zone	VC-12MTC	10 ft
VC-5TC	5	5, 8, 12 zone	VC-5MTC	15 ft.
VC-8TC	8	8, 12 zone	VC-8MTC	15 ft.
VC-12TC	12	12 zone	VC-12MTC	15 ft.
VC-5TC20	5	5, 8, 12 zone	VC-5MTC	20 ft.
VC-8TC20	8	8, 12 zone	VC-8MTC	20 ft.
VC-12TC20	12	12 zone	VC-12MTC	20 ft.

Power & Thermocouple combination cable 10 & 15 ft. lengths

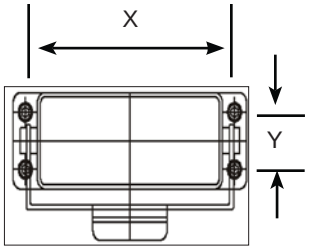
Item Number	Number of zones (Max.)	From 10 Amp mainframe(s)	To mold end
VC-MPTC-10	1	1, 2 zone	CKPTIC-1
VC-MPTC-15	1	1, 2 zone	CKPTIC-1

***Custom lengths and connectors available upon request.**

Mold Connectors

Mold Power and Thermocouple input connectors are mounted on the mold to accept the appropriate cable.

Mold Power Connectors are supplied with six inches of number 14 gauge wire leads and a ground wire.*



VC-5MPC

VC-8MPC

VC-12MPC

Mold Power Input Connectors

Item Number	Number of zones (Max.)	Amps (Max.) per zone	Dimensions in inch	
			X	Y
VC-5MPC	5	15	3.386	.689
VC-8MPC	8	15	3.386	.689
VC-12MPC	12	15	3.386	.689

VC-5MTC

VC-8MTC

VC-12MTC

Mold Thermocouple Connectors

Item Number	Number of Pins	Number of zones (Max.)	Dimensions in inch	
			X	Y
CKPTIC-1	5	1	N/A	1.180
VC-5MTC	10	5	3.268	1.260
VC-8MTC	16	8	4.055	1.260
VC-12MTC	24	12	5.118	1.260

*Ground wire must be connected to mold to ensure operator safety.

NEW OEM Mold End Prewired Terminal Mounting Boxes

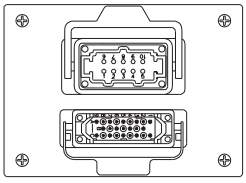
DESIGN FEATURES

- TWO PIECE COVER
- FREE-STANDING CONSTRUCTION FOR EASY TERMINAL ACCESS
- CONVECTION COOLING HOLES
- WIRING DIAGRAMS (INSIDE COVER)
- 200°C TFE INSULATED WIRE

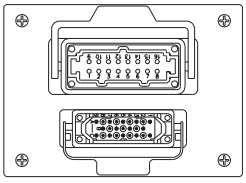
PTC5WTB-TS

PTC8WTB-TS

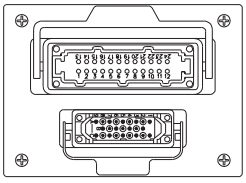
PTC12WTB-TS



PTC5WTB-TS
PCS / DME Style

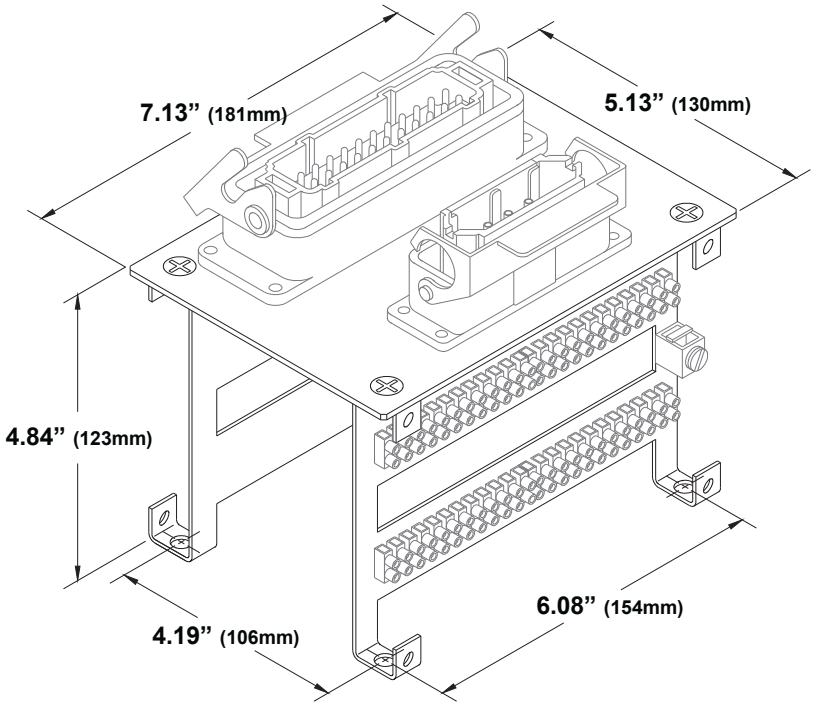


PTC8WTB-TS
PCS / DME Style



PTC12WTB-TS
PCS / DME Style

OEM Mold End Prewired Terminal Mounting Boxes

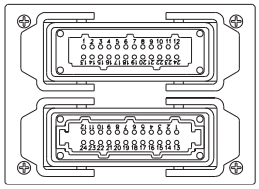


PTC12DWTB-TS

PITC8WTB-TS

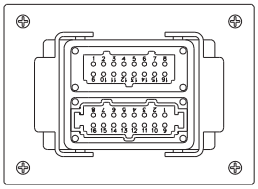
PITC12WTB-TS

PICH6WTB-TS



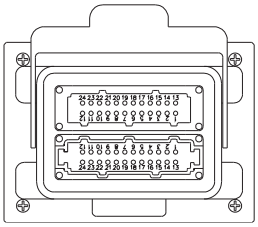
PTC12DWTB-TS

HBE24 Double Latch Style



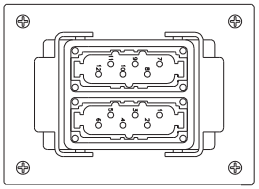
PITC8WTB-TS

Generic Style



PITC12WTB-TS

Mold Masters Style



PICH6WTB-TS

DME High Power Style

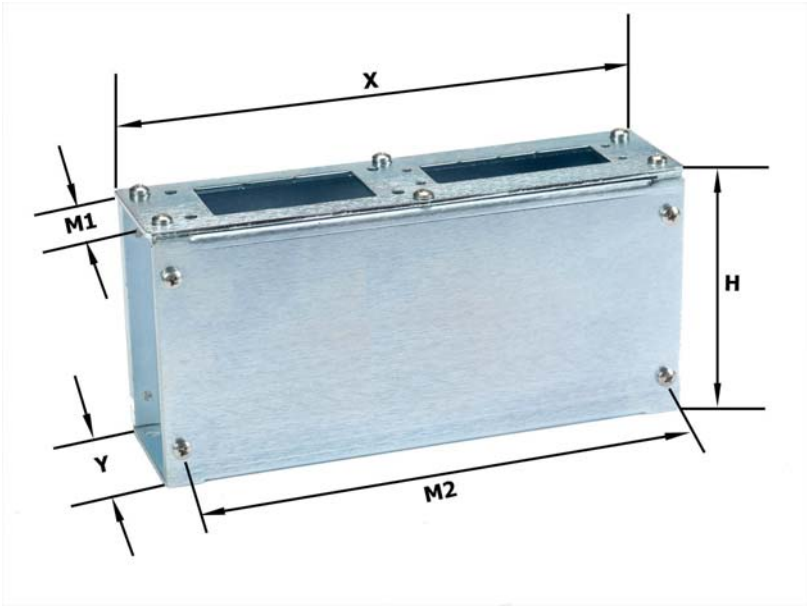
OEM Mold End Blank Combination Terminal Mounting Boxes

Choose the Combination Terminal Mounting Box for its economical and rugged design.

PTCE5TB

PTCE8TB

PTCE12TB



M= Mounting screw spacing. Clearance for 1/4 SHCS.

OEM Mold End Blank Combination Terminal Mounting Boxes

Item Number	OEM Style	Dimensions in inch					Accepts
		Y	X	H	M1	M2	
PTCE5TB	HBE10 Double Latch Style	2.440	9.47	4.100	1.500	8.84	PICE5, MTCE5
PTCE8TB	HBE16 Double Latch Style	2.440	10.53	4.100	1.500	9.91	PICE8, MTCE8
PTCE12TB	HBE24 Double Latch Style	2.440	12.79	4.100	1.500	12.17	PICE12, MTCE12

OEM Mold Power & Thermocouple Conversion Cables

OEM Mold Power Conversion Cables

Item Number	OEM Style	# of zones (Max.)	From 15 Amp mainframe(s)	To Double Latch Mold End	Length
MPCE5-10	HBE10 Double Latch to PCS/DME Style	5	5, 8, 12 Zone	PICE5	10 ft.
MPCE8-10	HBE16 Double Latch to PCS/DME Style	8	5, 8, 12 Zone	PICE8	10 ft.
MPCE12-10	HBE24 Double Latch to PCS/DME Style	12	5, 8, 12 Zone	PICE12	10 ft.
MPCE5-20	HBE10 Double Latch to PCS/DME Style	5	5, 8, 12 Zone	PICE5	20 ft.
MPCE8-20	HBE16 Double Latch to PCS/DME Style	8	5, 8, 12 Zone	PICE8	20 ft.
MPCE12-20	HBE24 Double Latch to PCS/DME Style	12	5, 8, 12 Zone	PICE12	20 ft.

OEM Thermocouple Conversion Cables

Item Number	OEM Style	# of zones (Max.)	From 15 Amp mainframe(s)	To Double Latch Mold End	Length
TCE5-10	HBE10 Double Latch to PCS/DME Style	5	5, 8, 12 Zone	MTCE5	10 ft
TCE8-10	HBE16 Double Latch to PCS/DME Style	8	5, 8, 12 Zone	MTCE8	10 ft
TCE12-10	HBE24 Double Latch to PCS/DME Style	12	5, 8, 12 Zone	MTCE12	10 ft
TCE5-20	HBE10 Double Latch to PCS/DME Style	5	5, 8, 12 Zone	MTCE5	20 ft.
TCE8-20	HBE16 Double Latch to PCS/DME Style	8	5, 8, 12 Zone	MTCE8	20 ft.
TCE12-20	HBE24 Double Latch to PCS/DME Style	12	5, 8, 12 Zone	MTCE12	20 ft.

OEM Split Combination Power & Thermocouple Cables

Item Number	OEM Style	# of zones (Max.)	From 15 Amp mainframe(s)	To Mold End	Length
PITC12-10YFE	Mold Masters Mold End to PCS/ DME Style	12 power & 12 thermocouple	PCS Standard 5, 8, 12 Zone	PITC12	10 ft.
PITC12-20YFE	Mold Masters Mold End to PCS/ DME Style	12 power & 12 thermocouple	PCS Standard 5, 8, 12 Zone	PITC12	20 ft.
PITC12-10YME	Mold Masters Mold End to PCS/ DME Style	12 power & 12 thermocouple	From 15 Amp mainframe(s) using HBE / HAN 48 power & thermocouple connector	VC-12MPC & VC-12MTC	10 ft.
PITC12-20YME	Mold Masters Mold End to PCS/ DME Style	12 power & 12 thermocouple	From 15 Amp mainframe(s) using HBE / HAN 48 power & thermocouple connector	VC-12MPC & VC-12MTC	20 ft.

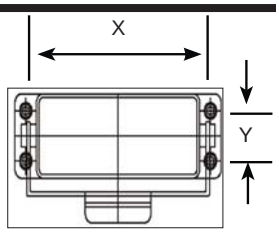
OEM Power & Thermocouple Cable

Item Number	OEM Style	#of zones (Max.)	From 15 Amp mainframe(s)	To Mold End	Length
PITC12-10	Mold Masters Style	12	12 Zone	PITC12	10 ft.
PITC12-20	Mold Masters Style	12	12 Zone	PITC12	20 ft.

***Custom lengths and connectors available upon request.**

OEM Mold Connectors

Mold Power and Thermocouple input connectors are mounted on the mold to accept the appropriate cable. Mold Power Connectors are supplied with six inches of number 14 gauge wire leads and a ground wire.*



PICE5

PICE8

PICE12

OEM Mold Power Input Connectors

Item Number	OEM Style	Number of zones (Max.)	Amps (Max.) per zone	Dimensions in inch	
				X	Y
PICE5	HBE10 Double Latch Style	5	15	3.86	1.260
PICE8	HBE16 Double Latch Style	8	15	3.86	1.260
PICE12	HBE24 Double Latch Style	12	15	3.86	1.260

MTCE5

MTCE8

MTCE12

OEM Mold Thermocouple Connectors

Item Number	OEM Style	Number of zones (Max.)	Number of Pins	Dimensions in inch	
				X	Y
MTCE5	HBE10 Double Latch Style	5	10	3.268	1.260
MTCE8	HBE16 Double Latch Style	8	16	4.055	1.260
MTCE12	HBE24 Double Latch Style	12	24	5.118	1.260

OEM Mold Power & Thermocouple Connector

Item Number	OEM Style	Number of zones (Max.)	Amps (Max.) per zone	Number of Pins	Dimensions in inch	
					X	Y
PITC12	Mold Masters Style	12 power & 12 thermocouple	15	2 x 24	5.827	2.756

*Ground wire must be connected to mold to ensure operator safety.

Replacement Parts

Item Number	Item Description
AC1512F	120v power cable connector

Item Number	Item Description
AC2024F	240v power input connector

Item Number	Item Description
CKPTM-1L	1 zone cable connector male with latch

Item Number	Item Description
CKPTF-1L	1 zone cable connector female with latch

Item Number	Item Description
CKF-312-G	Edge card connector

Item Number	Item Description
R144-002	Mainframe Rails

Item Number	Item Description
ABC-10	10 amp module fuse replacements (5 pack)

Item Number	Item Description
ABC-15	15 amp module fuse replacements (5 pack)

Item Number	Item Description
HWCC-1	T/C crimp connectors 18-22 AWG (30 pack)

Item Number	Item Description
HWCC-3	PWR crimp connectors 14-16 AWG (30 pack)

Replacement Parts

Item Number	Item Description
CKPM-112-BG	Power cable frame end kit

Item Number	Item Description
CKPF-112-BG	Power cable mold end kit

Item Number	Item Description
CKTF-15-G	5 zone T/C cable mold end kit

Item Number	Item Description
CKPTM-1	1 zone cable connector male without latch

Item Number	Item Description
CKPTIC-1	1 zone 10 Amp mold power & T/C connector

Item Number	Item Description
CKTF-18-G	8 zone T/C cable mold end kit

Item Number	Item Description
CKTF-112-G	12 zone T/C cable mold end kit

Item Number	Item Description
CKTF-112-AG	T/C cables frame end kit

Item Number	Item Description
CKPTF-1	1 zone cable connector female without latch

Item Number	Item Description
CKPTOC1	1 zone 10 amp mainframe power & T/C connector

Accessories

Item Number	Item Description
PCT1000	Crimp tool

Item Number	Item Description
PET0001	Pin extraction tool

Item Number	Item Description
PIN0114	Male pin for power connector (30 pack)

Item Number	Item Description
R144-017	T/C ferrules (50 pack)

Item Number	Item Description
R172-002	White edge card contacts (20 pack)

Step Down Transformer Kit

PCS Transformer Kits are pre-wired and include an enclosed transformer (3-phase, 480 VAC input, 240 VAC output) with adjustable transformer primary voltage taps, one 10-foot cable for AC power-in (no connector), one 6-foot cable for mainframe (AC input), one fused safety switch, two extra fuses, floor stand, and all mounting brackets and required hardware.

Product not shown
***Floor Stand Included**

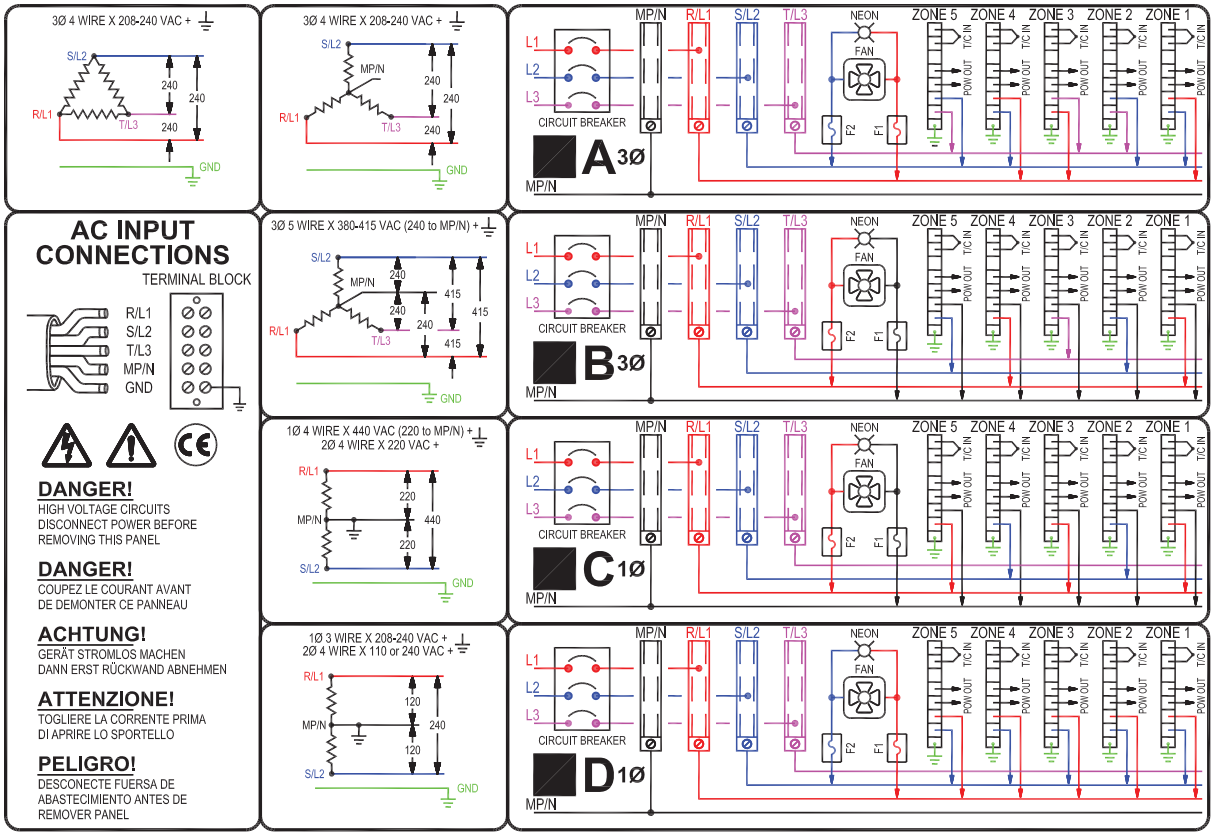
Item Number	Item Description
TK61AG*	6 KVA Transformer Kit
TK91AG*	9 KVA Transformer Kit
TK151AG*	15 KVA Transformer Kit
TK301AG*	30 KVA Transformer Kit

Item Number	Item Description
VC-FS	Floor Stand (Mainframe not included)

Assembly and mainframe mounting hardware included. Stand is made from heavy gauge steel and includes locking casters (400lb. rating).

Item Number	Item Description
VC-10BP	Mainframe blank panel

MAINFRAME INPUT WIRING OPTIONS



A NORTH AMERICAN STANDARD 3Ø 4 WIRE; 208-240 VAC

UNLESS OTHERWISE SPECIFIED MAINFRAMES ARE SUPPLIED WIRED IN THIS 208-240 VAC 3Ø CONFIGURATION

As detailed in diagram "A" above each control zone is powered by the voltage developed across one of the three phases R/L1, S/L2 and T/L3 (MP/N is not used). The zone input is staggered to balance the power system: Zone 1 to L1 & L2, Zone 2 to L2 & L3, Zone 3 to L3 & L1, Zone 4 to L1 & L2 and repeats as such.

B EUROPE / ASIA STANDARD 3Ø 5 WIRE; 380-415 VAC (240 to MP/N)

WARNING: The line to line voltages in this system are 380-415 VAC. The 240 VAC control modules and mainframe internal components will be SEVERELY DAMAGED if connected to this high voltage!

As detailed in diagram "B" above each control zone is powered by the 240 volts developed across one of the three phases ** AND ** MP/N (neutral): R/L1 and MP/N, S/L2 and MP/N, T/L3 and MP/N.

The zone input is staggered to balance the power system: Zone 1 to L1 & MPN, Zone 2 to L2 & MPN, Zone 3 to L3 & MPN, Zone 4 to L1 & MPN and repeats as such.

REWIRING THE MAINFRAME from one power system to another is easy and requires no special tools like crimp applicators: 1) Carefully cut the wire ties off of the zone input wiring bundle (lower bundle), 2) Disconnect all of the quick connect terminals from the RL1, SL2, TL3 and MPN brass distribution strips, 3) Reconnect each zone input wiring to the proper brass distribution strip as detailed above.

C 1Ø 4 WIRE; 440 VAC (220 to MP/N) *OR* 2Ø 4 WIRE; 220 VAC

WARNING: The line to line voltage in this system is 440 VAC. The 240 VAC control modules and mainframe internal components will be SEVERELY DAMAGED if connected to this high voltage!

As detailed in diagram "C" above each control zone is powered by the 220 volts developed across one of the two phases ** AND ** MP/N (neutral): R/L1 and MP/N and S/L2 and MP/N.

The zone input is staggered to balance the power system: Zone 1 to L1 & MPN, Zone 2 to L2 & MPN, Zone 3 to L1 & MPN, Zone 4 to L2 & MPN and repeats as such.

D NORTH AMERICAN STANDARD 1Ø 3 WIRE; 208-240 VAC

MAY BE USED ON 2Ø 4 WIRE 110 or 240 VAC

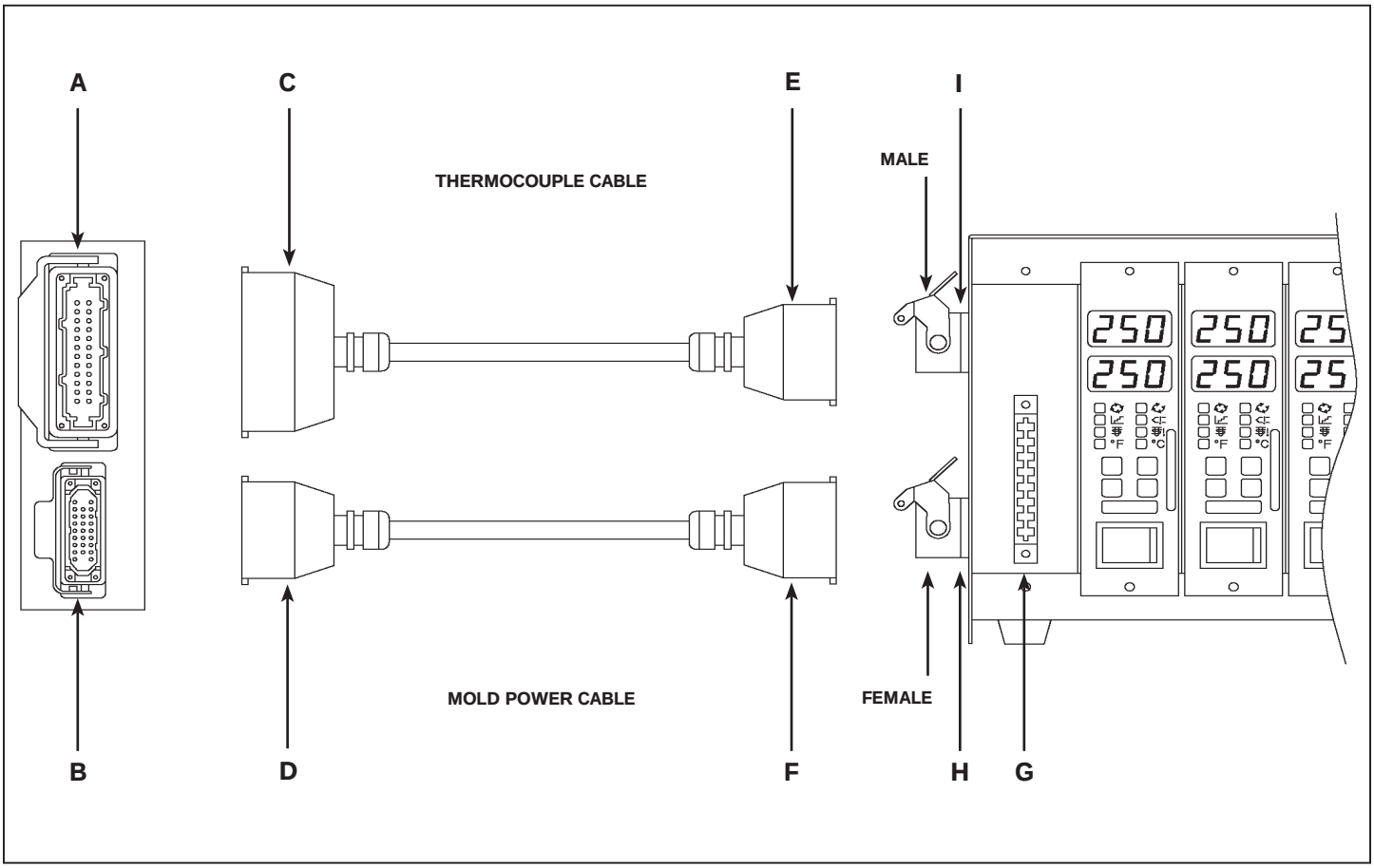
This is the most common 1Ø power system in the United States.

As detailed in diagram "D" above each control zone is powered by the 240 volts developed across the two phases R/L1 and S/L2: Zone 1 to L1 & L2, Zone 2 to L1 & L2 and repeats as such.

This power system will supply 120 VAC, if required, for use with a 120 VAC mainframe and control modules. In such a case (unless purchased as a 120V mainframe) the mainframe control zone input wiring must be changed so that the 120 VAC for each control zone is developed across one of the two phases ** AND ** MP/N (neutral) and staggered to balance the power system: Zone 1 to L1 & MPN, Zone 2 to L2 & MPN, Zone 3 to L1 & MPN and repeats as such.

WARNING: DISCONNECT ALL POWER BEFORE SERVICE!!

Replacement Parts Diagram



Reference Letter	Description	Item Number
A	Mold Thermocouple Output Connectors	See pg. 11
B	Mold Power Input Connectors	See pg. 11
C	Mold End Kit for 5-Zone Thermocouple cable	CKTF-15-G
	Mold End Kit for 8-Zone Thermocouple cable	CKTF-18-G
	Mold End Kit for 12-Zone Thermocouple cable	CKTF-112-G
D	Mold End Kit for all 15 Amp Power cables	CKPF-112-BG
E	Frame End Kit for all Thermocouple cables	CKTF-112-AG
F	Frame End Kit for all 15 Amp Power cables	CKPM-112-BG
G	Edge Card Kit for all mainframe PC Boards (10, 15, or 30 Amp)	CKF-312-G
H	Power output kit for all 15 Amp mainframes	CKPF-212-BG
I	Thermocouple input kit for all mainframes	CKTM-212-AG

NEW

Visions 3000/2.0 Controller System

The Visions 3000/2.0 Control System is an advanced and affordable Hot Runner Temperature Controller designed for ease of use, reliability and precise temperature control. The Visions 3000/2.0 offers the flexibility to efficiently and economically operate in smaller single unit environments as well as centralized manufacturing facilities with sophisticated high cavitation processes.

In today's demanding environment, the molding industry requires the capabilities of the ATC (Adaptive Thermal Control) self-tuning algorithm and powerful diagnostic (Power Temperature Comparator) features, which provides invaluable insight into the operation of the mold.

The Visions 3000/2.0 temperature control system sets an industry standard with its proven robust design, precise temperature control, sophisticated features, ease of operation, dependability, modular design, flexibility and scalability of size.

Visions 3000/2.0 software incorporates many exclusive and intuitive features which allows superior operation and control over a wide range of molding applications. The Visions 3000/2.0 software also provides easy access to a variety of informational and diagnostic features, start up functions, adjustable alarm limits, boost, standby, zone slaving, password protection, wiring diagnostics and one-way and two-way communications, to mention just a few.

Visions 3000/2.0 Controller System Features

• Affordability
The Visions 3000/2.0 incorporates a wide variety of features at an economical price.

• ATC Control Technology
Adaptive Thermal Control technology utilizes an advanced algorithm which is adaptable to different molding environments for precise temperature control.

• Boost
The boost function is user selectable from the controller display or it can be automatic via peripheral interface. Customized or standard adjustable power group capabilities.

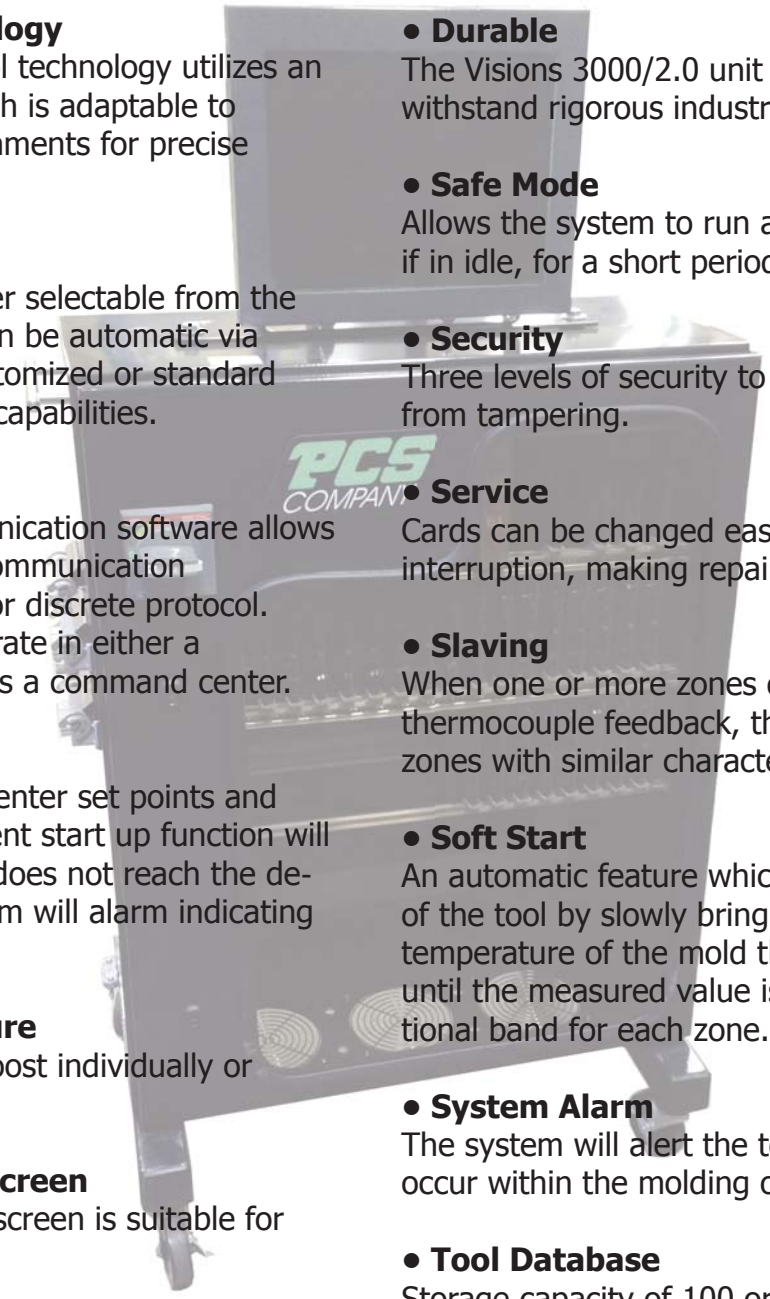
• Communications
Visions 3000/2.0 communication software allows sophisticated two-way communication capabilities by ethernet or discrete protocol. Remote devices can operate in either a supervisory function or as a command center.

• Ease of use
Turn the system on and enter set points and Visions 3000/2.0 intelligent start up function will do the rest. If any zone does not reach the desired set point, the system will alarm indicating the deficient zone.

• Global Editing Feature
Control set points and boost individually or grouped.

• Large Color Touch Screen
The visibility of the LCD screen is suitable for any environment.

• Multilingual
Visions 3000/2.0 can support English, Spanish, Danish, German and Italian. Other languages optional.



• Power Temperature Comparator
A diagnostic feature which displays actual power and temperature versus time.

• Durable
The Visions 3000/2.0 unit is manufactured to withstand rigorous industrial environments.

• Safe Mode
Allows the system to run at a lower temperature if in idle, for a short period of time.

• Security
Three levels of security to protect the system from tampering.

• Service
Cards can be changed easily with no interruption, making repairs quick and simple.

• Slaving
When one or more zones do not have thermocouple feedback, they can be linked to zones with similar characteristics.

• Soft Start
An automatic feature which bakes moisture out of the tool by slowly bringing up the temperature of the mold then supplying power until the measured value is within the proportional band for each zone.

• System Alarm
The system will alert the technician if errors occur within the molding operation.

• Tool Database
Storage capacity of 100 or more toolsets.

• Maximum Zone Capacity
Up to 256 zones of control

Visions 3000/2.0 Controller System Features *(cont.)*

• Self Diagnostics

The Visions 3000/2.0 Tool Diagnostics Suite performs a full set of functional tests to determine the condition of the mold,
controller and machine operation.

• Tool Diagnostics & Validation
Troubleshoots new or existing
tools, checking for faults such as:

– Swapped heater or thermocouple wires. If one is found, the controller indicates the affected zone.

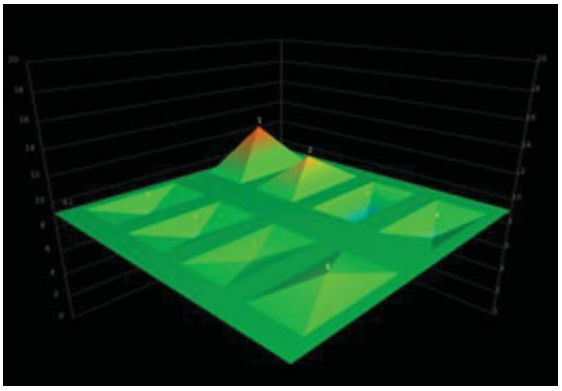
– Heater power monitoring (heater amperage and/or wattage) to detect current leakage
– Heater resistance monitoring to predict heater failure.
– Thermocouple open, short, reversed, etc.
– Measures resistance of each heater for failure analysis.

• Machine Interface
Visions 3000/2.0 can take a cyclical or constant input from the machine and tool while in production and trigger a shut down if operations cease after a selectable period of time.

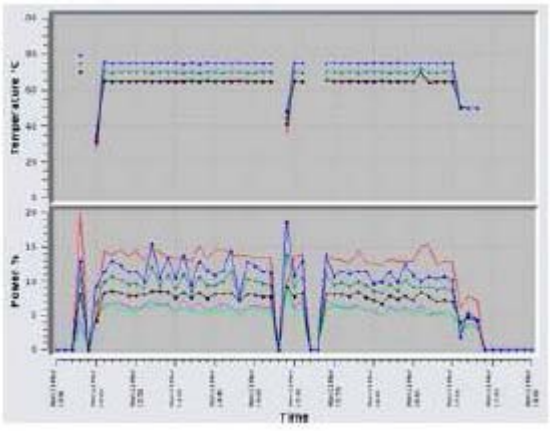
• Visual Diagnostics
LED's are visible on the front control panel monitoring CPU communications, fuse condition and output activity of each zone.

• Surface Graphs
Surface Graphs provide immediate insight into the operation of all tool zones.

• Trend graphs
Provides a scalable display of the historic values for a particular zone.



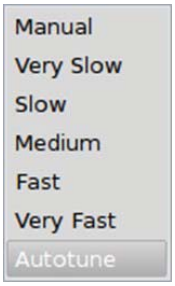
Trend Chart



Trend Graph

Temperature Zone Display

Visions 3000/2.0 Controller System Enhanced Features

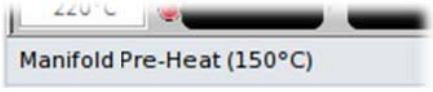


• Individual Heater Auto P.I.D Tuning:
The Visions 3000/2.0 has enhanced the ability to fine tune the most troublesome of molds. Under normal operations, tuning is carried out during the warm up process, individually tuning each heater to control within 0.5° F of set point. The Auto Tune is carried out automatically each time the controller is turned on. Incorrect P.I.D. tuning is the main reason for inconsistent temperature control. For troublesome tools, auto tuning can be turned off allowing the operator to select from a range of 5 different settings which can fine tune the P.I.D. operating to match the tool.

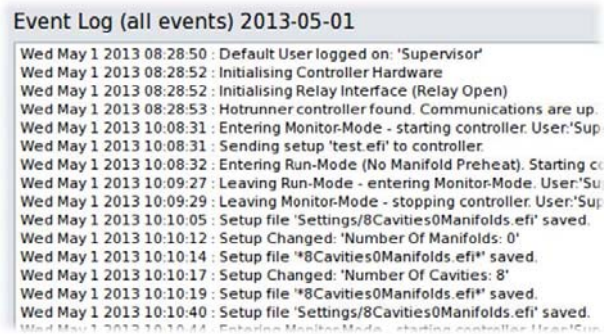
• Individual Heater Alarm Tolerance Settings:
Heaters can be allocated individual settings, to prevent global alarm settings being triggered by minority, problematic thermocouples. Each heater/thermocouple combination has it's own trigger point and values assigned to operate independently.

• Individual Heater Power Consumption Monitoring:
All Cavity heaters power consumption is constantly and individually monitored. Any increase in power demand is the first sign of a developing problem and early detection is vital in preventing avoidable scrap and tool down time in the machine.

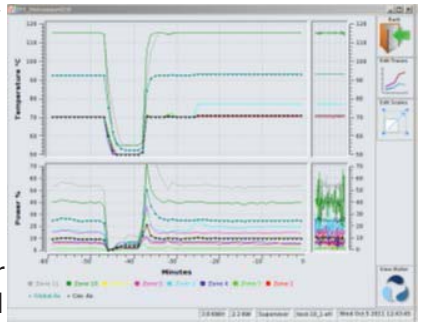
• Programmable Manifold Pre-heat Start Up Groups:
The user has the ability to define the start up sequence of the manifold heaters. This is useful for tools with a large number of heaters that exceed the maximum current available if ramped together and provides the means to program the specific start up recommendations of the hot runner manufacturer, automatically balancing the hot runner during the critical warm up phase.



• 12 Months of Fully Downloadable Production History, Alarm Logs & Graphs:



All production data is automatically stored for a period of 12 months. Data includes, individual heater power usage and temperature during the production cycle, on a second by second basis. All initial set-up settings, user and set point changes made during production, Alarm activations and errors. Water flow (gallons/liters per minute) and water temperature (F° & C°).

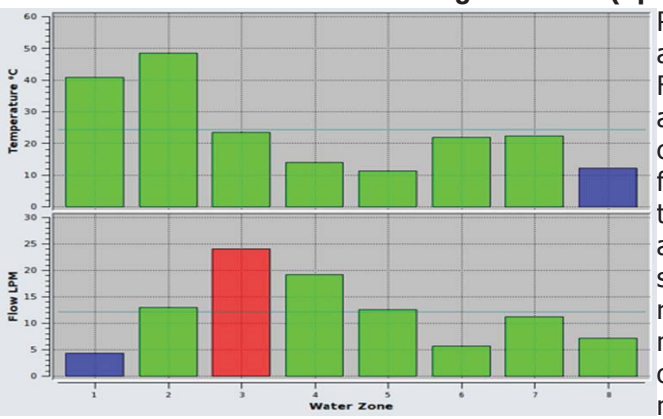


Tool diagnostic reports and set up files. All data is date and time stamped and viewablefrom the Visions 3000/2.0 controller screen or downloadable to a PC or Laptop. Set up data is transferable between Visions 3000/2.0 controllers. Data cannot be deleted by the user and is password protected.

• USB, Ethernet & Wi-Fi for download, upload & real time off site monitoring:
All data can be downloaded via USB to PC or Laptop for back up and viewing. The data can be viewed as a text file, spread sheet or in graph format, allowing for easy distribution of information, internally or to other group. Real time off site monitoring and ITC monitoring can be implemented via the Ethernet/Wi-Fi facility. This feature is particularly valuable for directly supporting International customers.

Visions 3000/2.0 Controller System Enhanced Features *(cont.)*

• Real Time Water Flow Monitoring & Alarms (optional):



Real Time water flow and temperature monitoring with warring alarms can now be automated via the Visions 3000/2.0 controller. Flow sensors are precisely installed in the PCS Smart Manifold with an interface module added to the Visions 3000/2.0 control. Any critical drop in the water flow rate will trigger a safety response from the Visions 3000/2.0 controller. If so setup, power can be cut to the tool heaters, a machine stop trigger activated and machine alarm activated. No water, no power! The water data will also show trend changes and gradual flow reduction which is particularly useful for maintenance to monitor the condition of the water filters. Multi channel water mapping of the tool willprovide significant information and production benefits. All water data and alarm activations are recorded in the downloadable data and graphs history database.

- Open T/C
- Reversed T/C
- Temperature Over/Under
- Open Flow-Sensor
- Flow-rate Over/Under

• Minimum Cavity Set Point Temperature:

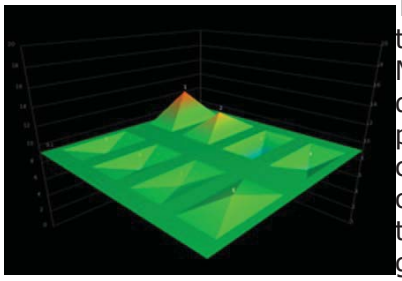
It's bad practice to turn off unused zones in any mold, this creates cold spots which can effect the balance and flow of material within the system. It's much better to enter a low temperature that keeps the tool balanced, in a manner which won't produce parts in any zones. The minimum set point option allows the supervisor to enter the minimum acceptable temperature, normally around 240° F (depending on the type of material). This will prevent the operator from turning the unused zones off, in its place they will have to enter a temperature instead of turning them off.

• Saved & Downloadable Diagnostic Reports:

The tool diagnostic function is a very important facility. Not only for diagnosing tool problems, but as a means of tracking the performance and reliability of the heaters & thermocouples over time. Downloadable diagnostic reports allow the tool room to run comparison checks against previous service and repairs data to maintain a contemporaneous record of the tools history. The diagnostic reports provide useful evidence and can be submitted to the tool maker or hot runner manufacturer during quality disputes and tool trials prior to delivery.

1	-> 1 Up; 25 Sec	312 Ω	28°C
2	-> 2 Up; 20 Sec	370 Ω	29°C
3	-> 3 Up; 18 Sec	358 Ω	29°C
4	-> 5 Up; 22 Sec	367 Ω	30°C
5	-> 4 Up; 22 Sec	398 Ω	29°C
6	-> 6 Up; 21 Sec	319 Ω	31°C
7	-> 7 Up; 22 Sec	380 Ω	32°C
8	-> 8 Up; 17 Sec	68 Ω	32°C
9	Unknown	45 Ω	20°C

• Improved Diagnostic Graphs for Power, Temperature & Water Interrogation:



The diagnostic trend and surface graphs have been improved to provide greater detail while presented in a simpler form. Many of the functions have been automated making them quick and easy to use and under-stand. The information provided is much clearer and more detailed, while being less cluttered. Water flow functions have been added to the suite of graphs, providing detailed analysis of both flow rate and temperature. A time line function has been introduced to the graphs to enable the production history to be searched for by specific times and dates during the previous 12 months.

• Industrial Grade Color Touch Screen Interface:

The introduction of the Linux operating system has presented the opportunity to maximize the potential of the touch screen interface, and fully utilizing all the benefits and advantages of touch screen technology. Like previous Visions 3000/2.0 systems we utilize 4mm safety glass as screen protection so the unit integrity is not compromised by the environment.

Visions 3000/2.0 Controller System
WaterFlo/Smart Manifold Option

The Visions 3000/2.0 Controller System is compatible with the WaterFlo/Smart Manifold Option

Visions 3000/2.0 Controller System
WaterFlo/Smart Manifold Option

Why Water Flow Monitoring & Hot Runner Controls in One Package ?

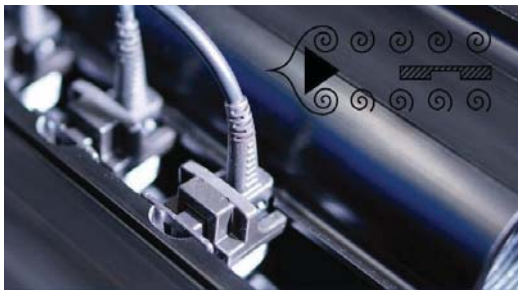
It just makes sense!

For the first time PCS offers Injection Molders an affordable solution for the precise monitoring of flow rate and temperature within each channel of a tools cooling system combined with VISIONS 3000 Hot Runner Temperature Controller.

The integration of Smart Manifold with the VISIONS 3000 Hot Runner Control, provides insight into the molding process far beyond what can be derived from the individual systems.

- All Hot Runner & Water Cooling information is displayed together.
  "Cavities (Gray)" "Manifolds (Red)" "Water (Blue)"
- The system provides precise data for temperature and flow rate of each water channel. (+/-1.5%)
- System can also be configured to monitor the main water input and output pressure.
- By bringing this information together in one place, the linkage of how events in one system affect the behavior of the other can be easily recognized.
- Reduces back and forth time trying to figure out what the problem is and how to best to solve it.
- The ability to see how a change in one cooling channel affects hot runner heating in unassociated areas of the tool.
- The two systems together as a package can greatly improve the efficiency of the molding cycle.
- Improves consistency in quality and deformation stability to a much higher level.
- Provides accurate up to the minute data.
- More effectively protects the mold from catastrophic failures, by alarming if any area is suspect. The VISIONS 3000 has several alarm options ranging from screen notification to molding machine shut down.
- Often overlooked by many molders; the efficiency of each cooling circuit is critical to a stable molding process and the production of high quality, dimensionally stable parts.
- The VISIONS 3000 stores in one place, one year of step by step historical data for each zone of both cooling and hot runner heating operations. This invaluable information is date & time stamped for future reference. There is no more guessing as to what transpired and who did it.
- Tool setting for both the Hot Runner & Cooling Systems can be stored on the VISIONS 3000 database and called up the next time the tool is set-up. The database can store in excess of 100 tool sets.
- Like all VISIONS 3000 systems, the *Smart Manifold* is a robust unit which can withstand the rigors of industrial environments.

The *Smart Manifold* has been meticulous engineered and designed to provide exceptional accuracy. This is only possible by the exclusive design and exacting machining of the manifold extrusion which allow for proper placement of the advanced vortex sensors.



- The *Smart Manifold* works on the Bernoulli principal, meaning there are no moving parts to wear out, which equates to a long service life while also allowing for operation with heavily contaminated water.
- Sensor placement within the *Smart Manifold* have been precisely engineered for maximum temperature and flow accuracy.
- The advanced sensors are retained by a simple clip.

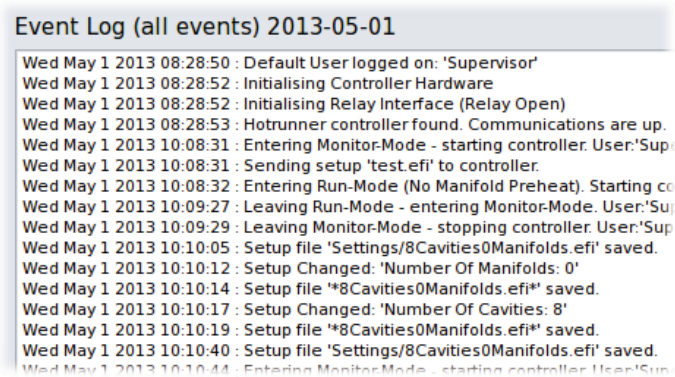
Visions 3000/2.0 Controller System
WaterFlo/Smart Manifold Option

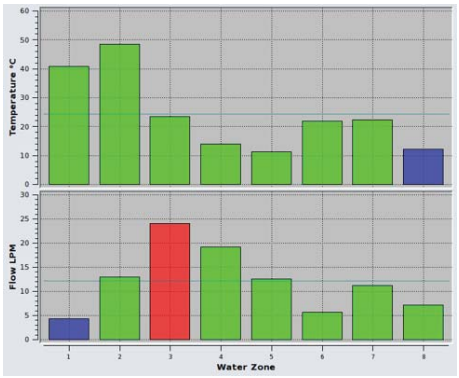
The PCS Intelligent Water Flow Monitoring System can protect your mold, improve quality while also improving cycle time. This is done by quickly identifying cooling problems and alerting to various common cooling channel problems such as:

- No or reduced water flow from the water chiller/heater
- Blocked waterways on a cooling circuit by circuit basis
- Reduction in system operating pressure
- Scale / rust build up
- Inconspicuous / minor leaks
- Incorrect setting of the water chiller / heater
- Faulty water chiller / heater operation
- Incorrect piping

Often overlooked is the importance of historical data. With the PCS system, information is stored for one year, is date and time stamped for tractability. Recording historical data means a performance log for each channel in the water cooling system is stored in the systems memory, allowing the user to track channel by channel performance and identify problems. This Data can be downloaded onto a USB stick or via Ethernet connection.

More importantly historical information provides operational insights not normally available to the user. By displaying data in a graphic format, the user can easily spot trends in deteriorating performance for any channel.





Tool Validation:

The tool Validation function of the VISIONS 3000 can provide documentation certifying the condition of the tools hot runner & cooling systems prior to installation in the molding press. Without proper Tool Validation the molder can only hope there are no problems with all cooling and hot runner zones. Until now it has been both difficult and/or very expensive to measure actual flow rate and temperature for each cooling channel in the mold. Now with the VISIONS 3000 and the *Smart Manifold* you have the ability to read actual flow & temperature elements. With the VISIONS 3000 both the tools hot runner and cooling system can be fully validated and results recorded to establish a base line before the tool is put into production. You now have the ability to compare known actual base line date with actual in-process performance, thereby fully understand tool operation.

Now the VISIONS 3000 with the optional *Smart Manifold*, allows the user to bring all processes elements (Molding Machine, Hot Runner Control & Mold Cooling System) to the light of day, by provide actual feedback on the tools operation, allowing for intelligent decision making.

As any good process engineer will testify, it is not what the machine is told to do that is important; it is what the machine is actually doing that matters.

Visions 3000/2.0 Controller System
WaterFlo/Smart Manifold Option

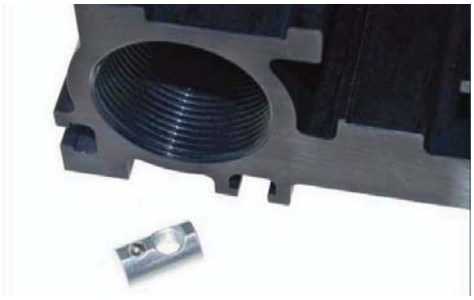
Hardware:

SMART MANIFOLD: a

The intelligent design of the *Smart Manifold* allow for the sensors to be located within the Manifold. This produces a slim line unit with a small footprint. The design also provides protection for the sensors by keeping them enclosed within the manifold assembly.

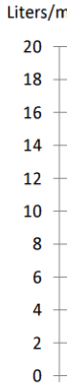
The *Smart Manifolds* are manufactured from custom aluminum extrusions which are black anodized to resist corrosion. These extrusions are designed to specifically produce a precise linear flow path for each sensor. With meticulous attention to detail the sensors locations are positioned to provide accurate measurement.

The manifolds can be mounted on machine platens or the mold with "roll-in" "T-nuts" which fit in Integrated



extruded slots, which are located on two faces of the extrusion. The compact slim line design of the manifold enables it to be mounted in the smallest space possible next to the machine, on platens or on the mold, keeping the pipe runs to the absolute minimum.

The *Smart Manifold* has 1-1/2" ports on both ends of the manifold to accommodate main water "in/out" flow. This allows maximum flexibility when connecting the water supply. There are 1/2" ports for the individual channels for both "in" and "return" lines



SENSOR:

The Smart Manifold is equipped with very compact sensors that are capable of reading both flow rate & temperature. The sensor is based on the vortex flow measurement principal, which uses a bluff body in the middle of the flow path to create a small eddy current (vortices) and the pressure of this current is measured to determine the flow through a given cross sectional area.

The sensors have no moving parts, this combined with a large flow path, make them ideally suited to mold cooling, even when using heavily contaminated water.

The sensors are integrated directly into the manifold, keeping size to a minimum while protecting them from damage.

Sensors are available with two flow ranges to suit the application (4 gpm/15 lpm & 10 gpm/40 lpm). Sensors are held in place with a simple clip arrangement which makes replacement effortless therefor keeping maintenance very simple.

Sensors are also available which will read out the main system water in-put and out-put pressure, allowing for up to the minute and historical review.

INTERFACE MODULE:

The system is equipped with a interface module which is mounted on the VISIONS 3000 system. The interface module allows multiple manifolds to be daisy-chained together, to seamlessly monitored the system and facilitate true "plug and play" with a simple connection. The interface module allow for the user to easily add additional Smart *Manifolds* at any time.

Visions 3000/2.0 Controller System
WaterFlo/Smart Manifold Option

Technical Specifications:

Smart Manifold	
Manifold Feed	1-1/2" NPT
Manifold Ports	1/2" NPT
Number of Ports	4/8/12 Standard (other sizes on request)
Valves (optional)	Color coded ball valves per channel (optional)
Operating Temperature (max)	32° F - 195° F (0° - 90° C)
Operating Pressure (max)	140 PSI
Temperature Sensing	Per Channel (return)
Flow Sensing	Per Channel (return)
Temperature Sensing Main Inlet	Yes (optional)
Power Supply	12 - 24 Vdc

Sensor	
Sensor Type	Vortex
Range (flow)	Series 1 = 4 gal/min (15 liters/min) Series 2 = 10 gal/min (40 liters/min)
Accuracy (flow)	1.5% full scale
Range (temperature)	32° - 195° F (0° - 90° C)
Resolution (temperature)	.5°
Accuracy (temperature)	+/- 1.5% full scale
Sensor Signal	+/- 0.35 - 3.5Vdc
Output Signal	Voltage
Response Time	< 1 sec.
Power Supply	5 Vdc
Burst Pressure	200 PSI @ 100° F

Item #	Item Description
WF-SM4-1	Water Flow - Smart Manifold - 4 Channel - 4 gpm
WF-SM4-2	Water Flow - Smart Manifold - 4 Channel - 10 gpm
WF-SM8-1	Water Flow - Smart Manifold - 8 Channel - 4 gpm
WF-SM8-2	Water Flow - Smart Manifold - 8 Channel - 10 gpm
WF-SM10-1	Water Flow - Smart Manifold - 12 Channel - 4 gpm
WF-SM10-2	Water Flow - Smart Manifold - 12 Channel - 10 gpm
WF-INT	Water Flow - Interface
WF-IOPS	Water Flow - In/Out Pressure Option

Notes

Notes

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